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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/827,424	04/20/2004	Yuu Inatomi	43888-314	2569
7590 MCDERMOTT, WILL & EMERY 600 13th Street, N.W. WASHINGTON, DC 20005-3096			EXAMINER CHU, HELEN OK	
		ART UNIT 1795	PAPER NUMBER	
		MAIL DATE 01/11/2008	DELIVERY MODE PAPER	

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/827,424	INATOMI ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Helen O. Chu	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 28 June 2007.
- 2a) This action is **FINAL**.      2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 20,22-55 and 57 is/are pending in the application.
  - 4a) Of the above claim(s) See Continuation Sheet is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 22,25, 28,32,35,38,41,44,47,50, and 53 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.
 

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) All    b) Some \* c) None of:
    1. Certified copies of the priority documents have been received.
    2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) Notice of Informal Patent Application
- 6) Other: \_\_\_\_\_.

Continuation of Disposition of Claims: Claims withdrawn from consideration are 20,23,24,26,27,29-31,33,34,36,37,39,40,42,43,45,46,48,49,51,52,55 and 57.

## DETAILED ACTION

1. Applicant's Arguments were received on June 28, 2007.
2. The text of those sections of Title 35, U.S.C. code not included in this action can be found in the prior Office Action.

### ***Claim Rejections - 35 USC § 103***

3. The rejections under 35 U.S.C 103(a), unpatentable over Zhang et al. and in view of Carlier et al. on claims 22, 25, 28, 32, 35, 38, 41, 44, 47, 50, 53 are maintained. For convenient purposes the rejection is repeated below.
4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

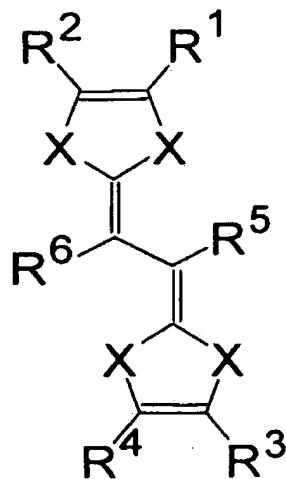
(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 22, 25, 28, 32, 35, 38, 41, 44, 47, 50, 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et al. (US Patent 6,110,619) and in view of Carlier et al. (Publication Electrochimica Acta)

6. The Zhang et al. reference teaches a secondary battery (Column 1, Line 37) comprising a positive electrode, a negative electrode and an electrolyte where the positive electrode has an organo-sulfur structure (Column 2, Line 52). The negative electrode active material includes a carbon material and a lithium metal (Column 6, Lines 5-7). The positive electrode active material includes a metal oxide (Column 5,

Line 63-64) and is mixed with a conductive material (Column 5, Lines 54-56). The Zhang reference further discloses the electrolyte comprises a solvent where the anion and lithium cation diffuse in and the compound is capable of forming a coordinate bond with the lithium cation by oxidation-reduction reaction (Column 8, Lines 6-22). Some examples of electronically conductive polymers used in sulfur containing solid composite electrodes included polyacetylenes. However, the Zhang et al. reference does not discloses a structure represented by formula (1a). the Carlier et al. reference discloses a structure represented by the following formula:

(1a)



Where X = S, R<sub>1</sub> to R<sub>4</sub> are methyl or substituted methyl groups. R<sub>5</sub> and R<sub>6</sub> are hydrogen atoms. Furthermore, Carlier et al. discloses the compound induces fast electron transfer and can control relative stabilities of the different redox species (Conclusion; Pages 3269-3276). Therefore it would have been obvious to one of ordinary skill to use

thiafulvalenes as disclosed by Carlier et al. into the secondary battery with organic sulfur electrodes as disclosed by Zhang et al. to increase the electroconductivity. Finally it is known in the art that in a secondary battery the positive and negative electrodes can function interchangeable depending on whether the battery is charging or discharging and therefore the same compounds used for a positive electrode can be used for negative electrodes.

It is noted that claims 50 and 53 are product-by-process claims. "Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F. 2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). Since product is similar to that of the Applicant's, Applicant's process is not given patentable weight in this claim.

### ***Response to Arguments***

7. Applicant's arguments filed June 28, 2007 have been fully considered but they are not persuasive.

Applicants' principal arguments are:

A) It was admitted in the Office Action that Zhang fails to teach the specific compound of formula 1 (a). However, it was alleged that Zhang teaches that the positive electrode active material has an organo-sulfur structure. Thus, it is implied that Zhang

suggests a compound of formula 1 (a). However, the passage of Zhang cited in the Office Action (col. 2, line 52) states that "herein, the term 'organo-sulfur materials' means a material containing organic sulfur compounds with only single or double carbon-sulfur or sulfur-sulfur bonds". As the compound of general formula I(a) contains carbon-carbon bonds, then compound I(a) does not fall into the category of organo-sulfur compounds as defined in the Zhang reference. In fact, nowhere in Zhang is there a mention of the use of a compound of formula 1 (a) as a positive electrode active material.

B) In addition, Carlier appears silent with respect to the use of a compound of formula 1 (a) in secondary batteries. As Zhang fails to disclose that compounds of the general structure as described in Carlier may be used in secondary batteries, and as Carlier does not disclose the use of the compound of formula 1 (a) in secondary batteries, there does not appear to be the requisite teaching or suggestion necessary in either reference to combine the two references. The Examiner is merely using improper hindsight, gained from the information contained in the present application, to combine the two references.

C) As proof that the compound of formula 1 (a) can be used as a positive electrode active material, the Examiner alleges that Carlier discloses that the compound of formula 1 (a) induces fast electron transfer and can control relative stabilities of different redox species. However, this information is in reference to the induction of structural conformation changes and the dimerization of the molecule, not with the use of the compound in a secondary battery. As such, it would not be obvious to use a

compound disclosed in the Carlier reference as an active material in the positive electrode in Zhang.

D) Applicants refer the Examiner to § 2141 of the MPEP entitled, "Basic Considerations Which Apply to Obviousness Rejections", part (B) which states, "The references must be considered as a whole and MUST suggest the desirability and thus the obviousness of making the combination." Moreover, the Supreme Court recently upheld that a patent composed of several elements is not proved obvious without identifying a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements (KSR International Co. v. Teleflex Inc., 550 U.S. 14-15 (2007))

In response to the Applicants' arguments please consider the following:

A) It is admitted by the Examiner that the Zhang reference does not disclose the Applicants' claimed formula of 1(a), otherwise the Examiner would have rejected the claims on the basis of U.S.C.102 rejection. The Zhang reference does teach an organo-sulfur material, please keep in mind that "organo sulfur" material is a broad compound. The Examiner used the Zhang reference to teach a broad compound of organo-sulfur material which can include formula 1(a) and all others. The Examiner never implied that the Zhang reference teaches the specific formula 1(a). Furthermore, the Applicants have confused the statement made by the Zhang reference, "herein, the term 'organo-sulfur materials' means a material containing organic sulfur compounds with only single or double carbon-sulfur or sulfur-sulfur bonds". Please refer to the term "containing" in MPEP 2111.03 which is synonymous to the term "comprising." This means that

"organo-sulfur" compounds as disclosed in Zhang have "only single or double carbon-sulfur or sulfur-sulfur bonds" but is not limited to only these molecular bonds. Specifically, (Columns 4-5, Lines 52-7; Column 9, Lines 40-52), Column 16, Lines 50-65; Column 19, Claim 16) illustrates some of the embodiments of the invention as disclosed by Zhang which includes carbon carbon bonds.

B) The Examiner admits that Carlier reference alone does not disclose the compound of formula 1(a) used in secondary batteries by rejecting the Applicants claimed invention under U.S.C. 103(a) and not under U.S.C.102. However, the Applicants are arguing the references individually and not in combination of Zhang in view of Carlier and therefore, these arguments are not persuasive. Furthermore, the Carlier reference discloses the compound of formula 1(a) is electrochemically active (Page 3270, Lines 3-5) and has a redox behavior. It is known to one of ordinary skill in the art that a secondary battery is considered an electrochemical cell and exhibits redox behaviors.

In response to the Applicant's argument that the Examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the Applicants disclosure, such as a reconstruction is proper. *In re McLaughlin*, 443 F.2d 1392; 170 USPQ 209 (CCPA 1971)

C) The invention as disclosed by the Carlier reference is a compound that is electrochemically active which displays conformational changes associated with

electron transfer (Title and Abstract). Furthermore, it is unknown where the Applicants found the statement " to the induction of structural conformation changes and the dimerization of the molecule," however, the Carlier reference discloses that redox properties of a series of substituted vinylogous tertrthiafulvalenes (TTF) prepared by oxidative coupling of DTF (Abstract) indicates that the redox pairs are TTF and DTF in which depending on whether it is going through oxidation or reduction either TTF or DTF forms.

D) After further consideration, KSR International Co. v. Teleflex Inc., does apply to the Zhang in view of Carlier reference made by the Examiner .The Zhang reference discloses the claimed invention and a broad teaching of an organo sulfur material but does not specifically disclose formula 1(a). The Carlier reference discloses a compound with formula 1(a) having electrochemical and redox behaviors that yields strong conformational changes associated with fast electron transfer (Title and Abstract). It is known to one of ordinary skill in the art that a secondary battery is known to have electrochemical redox behaviors. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use TTF as disclosed by Carlier et al. in the secondary battery as disclosed by Zhang to increase the electroconductivity, a predictable result.

***Conclusion***

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Helen O. Chu whose telephone number is (571) 272-5162. The examiner can normally be reached on Monday-Friday 8am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

HOC



RAYMOND ALEJANDRO  
PRIMARY EXAMINER